Technical Report No. 6307

BURN DRESSINGS FROM FOAM ACRYLIC-AMIDE ELACTOMERS
REPORT NO. 2

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WALTER REED ARMY MEDICAL CENTER
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T. R. No. 6307*

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Recommend Approval:

Scientific Director

Approved:

Director

*Qualified requesters may obtain copies of this report from ASTIA.

A B S T R A C T

This report, the second in the series, describes the latest research done under Project 6-59-01-001-04 for developing a foam acrylic-amide elastomer suitable for a burn dressing. Changes in the process procedure are discussed and a physical evaluation of the samples submitted for surgical inspection is made.

I. Introduction

Three composites of foamed (90/7.5/2.5) Butyl acrylate/ methyl methacrylate/methacrylamide terpolymer elastomer burn dressing samples have been submitted to the Brooke Army Medical Center, Fort Sam Houston, Texas for surgical evaluation as a supplement the original composite of June 1962. This report will discuss process data and physical properties of foams in these three composites.

II. Process Data

Foams were made with compounded Acrylic-amide terpolymer elastomer latex synthesized by US APRL (TR 6224). They were prepared following the same procedure used for foams of the original composite (TR 6224) with these changes:

1. Foams were made with 600 and 1200 gram batches of latex
2. Acrysol HV-1 (Rohm & Hass Co.) was used for the thickening agent instead Modical VC (NOPCO Co.).
3. The blended latex was foamed to a five fold volume increase instead of a 4½ fold volume increase.
4. The wound contact surface of the foam was formed by allowing the foam to set on a mylar sheet and then cutting it from the sheet with a scalpel after it had dried.
5. The foams were not post-treated in formalin solution.

III. Foam Dimensions

Table I gives a size break-down of foams in the three composites. Foams of composite No. 1 (15 February 1963) were made with 600 gram batches of latex while foams of Composites No. 2 and No. 3 were made with 1200 gram batches of latex. Foams are numbered so that they can be easily referenced in laboratory note books as shown by this example:

S220-65-3 - Foam number

S220 - Laboratory book in which the process description of the foam is recorded.

-65 - The page number in the laboratory book.

-3 - The number of the process description on the page that refers to this foam.

The third set of digits is not used when there is only one process description on the page.

Table I

Foam Dimensions

Sample No.	Length (Meters)	Width (Meters)	Thickness (Meters)
Composite No. 1 (15 February 1963)			
W204-140-1	0.610	0.610	0.0035-0.0040
W204-140-2	0.508	0.431	0.0037-0.0044
W204-142-1	0.635	0.508	0.0030-0.0035
W204-142-2	0.305	0.305	0.0040-0.0050
W204-142-3	0.508	0.371	0.0043-0.0047
W204-142-4	0.355	0.305	0.0050-0.0060
Composite No. 2 (1 March 1963)			
W204-146	0.900	0.550	0.0040-0.0045
W204-147	0.900	0.550	0.0030-0.0050
W204-148	0.900	0.550	0.0035-0.0040
W204-150	0.900	0.550	0.0040-0.0050
W204-151	0.900	0.550	0.0020-0.0035
Composite No. 3 (5 May 1963)			
N184-71-17	0.900	0.550	0.0025-0.0035
N184-71-18	0.900	0.550	0.0030-0.0035
N184-71-19	0.900	0.550	0.0030-0.0035
N184-71-20	0.900	0.550	0.0025-0.0030
N184-73-1			0.0025-0.0030

IV. Physical Properties

Water through-put porosity, density and relative equivalent diameter properties (TR 6224) were determined for each foam and are recorded in Tables II, III and IV. Plots of water through-put porosity vs. pressure drop (Figures 1-6) show porosity to be a linear function of pressure drop with its magnitude dependent on foam thickness and density. The relative equivalent diameters were in the same range (45-60) microns for foams of all three composites but were 10 percent higher than the relative equivalent diameter range determined for foams of the original composite (TR 6224). The porosity magnitudes of foams in Composites No. 1 and 2 are equivalent those of foams in the first composite while the magnitudes of Composite No. 3 foams are higher than those of foams in the original composite.

V. Summary

Three additional composites of foamed acrylic-amide terpolymer elastomer have been submitted for surgical evaluation as burn dressings. The processing of these foams has been discussed and their physical properties have been presented.

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Table II

Physical Properties of Foam

Composite 1

Foam No.	W204-140-1		W204-140-2		W204-142-1		W204-142-2		W204-142-3		W204-142-4	
Sample No.	A	B	A	B	A	B	A	B	A	B	A	B
Water Through-put ($cc/cm^2/sec$)	17.4	18.6	13.8	11.4			8.6	18.1	15.5	15.1	5.3	5.2
Pressure Drop (cm H_2O	88.7	88.0	88.0	87.1			86.5	88.9	88.2	86.0	89.8	89.0
Water Through-put ($cc/cm^2/sec$)	11.6	12.9	9.3	7.7	23.4	21.0	6.3	12.9	10.6	11.8	3.3	3.1
Pressure Drop (cm H_2O)	62.8	62.3	64.9	61.9	63.6	64.0	63.0	63.5	61.0	64.0	62.3	62.6
Water Through-put ($cc/cm^2/sec$)	6.5	7.5	4.9	4.3	10.7	11.2	3.7	8.0	6.8	7.5	1.6	1.3
Pressure Drop (cm H_2O	36.8	37.6	37.6	37.8	37.8	38.0	37.7	37.6	37.3	37.3	36.0	35.7
Thickness (cm)	0.412	0.363	0.388	0.431	0.302	0.362	0.487	0.423	0.463	0.445	0.574	0.560
Density g/cm^3	0.161	0.165	0.183	0.179	0.187	0.172	0.197	0.201	0.166	0.163	0.198	0.221
Equiv. Pore Diam. (Microns)	54.1	54.8	45.1	46.3	61.6	55.2	43.8	61.4	56.3	57.0	33.6	35.2

Table III

Physical Properties of Foams

Foam No.	Composite 2									
	W-204-146		W-204-147		W-204-148		W-204-150		W-204-151	
Sample No.	A	B	A	B	A	B	A	B	A	B
Water Through-put (cc/cm^2/sec)	24.9	20.0	30.6	13.5	23.7		25.0	20.8	13.3	20.1
Pressure Drop (cm H_2O)	89.0	85.9	86.5	89.5	85.5		89.0	88.5	86.5	87.6
Water Through-put (cc/cm^2/sec)	17.0	15.4	23.1	8.70	15.9	31.2	15.4	14.6	9.2	13.9
Pressure Drop (cm H_2O)	63.3	62.5	63.7	61.7	62.0	56.5	62.3	62.3	62.9	61.5
Water Through-put (cc/cm^2/sec)	9.7	9.1	11.8	4.5	8.4	12.8	7.7	71	4.9	7.8
Pressure Drop (cm H_2O)	38.5	37.4	35.6	37.5	38.9	38.3	37.1	37.5	37.7	36.9
Density (gm./cm^3)	0.163	0.165	0.168	0.162	0.163	0.158	0.178	0.1650	0.175	0.191
Thickness (cm)	0.380	0.435	0.324	0.509	0.381	0.406	0.483	0.381	0.356	0.228
Equiv. Pore Size (Microns)	62.7	54.3	66.1	52.3	61.6	64.0	61.1	61.8	51.3	57.1

Table IV

Physical Properties of Foams

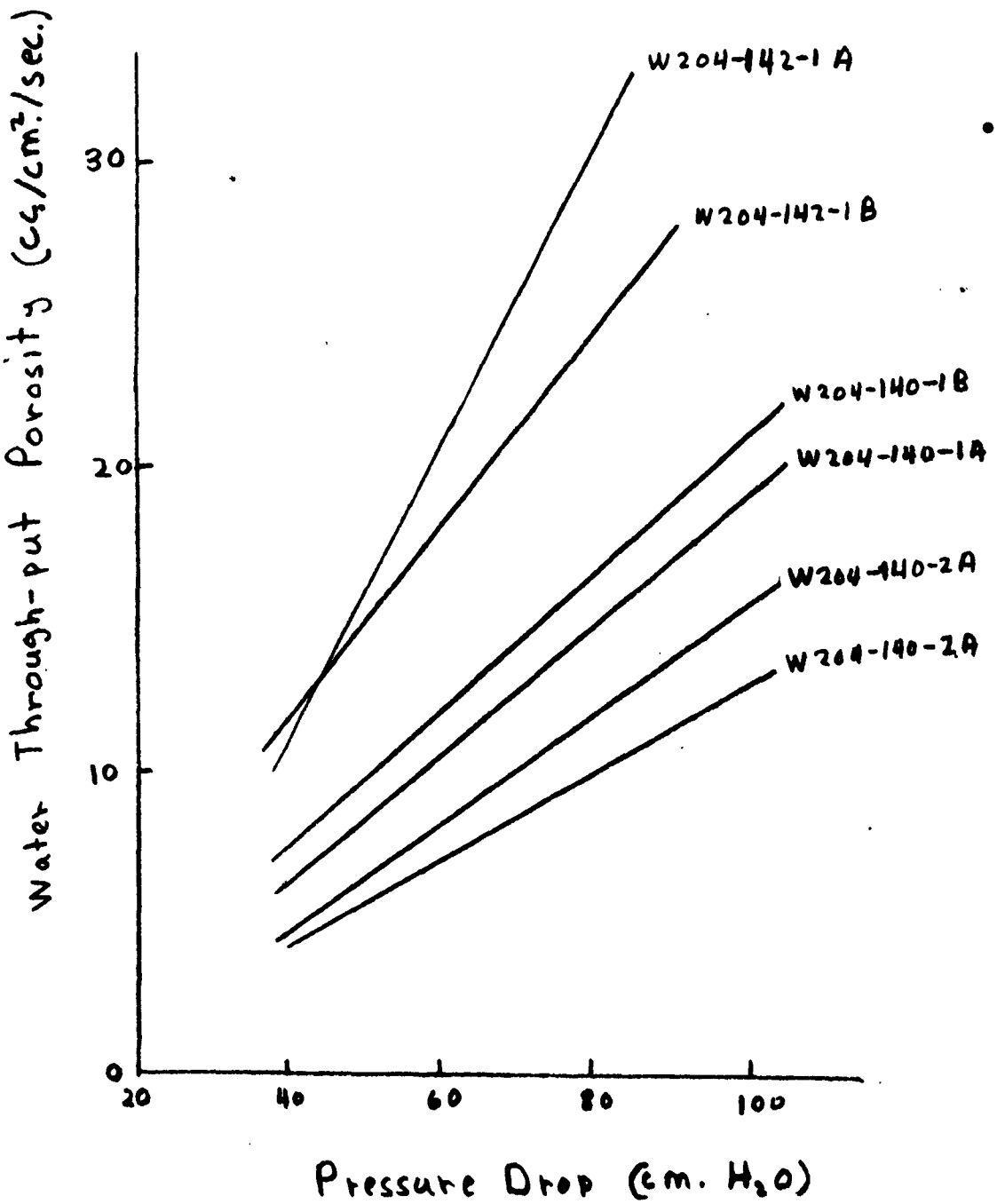
Composite 3

Foam No.	N-184-71-17		N-184-71-18		N-184-71-19		N-184-71-20		N-184-73-1	
Sample No.	A	B	A	B	A	B	A	B	A	B
Water Through-put ($cc/cm^2/sec$)	19.4	28.3	26.2	21.2	21.8	19.9	22.7	26.2	22.1	25.0
Pressure Drop (cm H_2O)	91.5	71.0	64.8	66.0	91.5	91.5	84.0	84.0	90.0	87.6
Water Through-put ($cc/cm^2/sec$	15.2	24.7	19.2	14.3	15.2	16.9	17.5	24.8	15.4	20.1
Pressure Drop (cm H_2O)	66.0	63.5	45.6	43.1	66.0	65.4	64.8	63.5	64.8	66.0
Water Through-put $cc/cm^2/sec$	10.5	9.8	12.5	9.8	10.2	10.9	11.1	15.9	10.5	12.8
Pressure Drop cm H_2O	37.5	37.4	28.5	28.7	38.0	40.6	38.1	37.3	39.4	39.0
Thickness (cm.)	0.330	0.333	0.295	0.312	0.305	0.330	0.310	0.262	0.280	0.266
Density gm/cm^3	0.158	0.154	0.152	0.158	0.166	0.153	0.157	0.158	0.169	0.163
Equiv. Pore Size (microns)	43.5	54.0	60.0	60.0	51.3	50.0	60.9	51.2	53.2	54.5

IKD. BY..... DATE..... JOB NO.....

Figure 1

Water Through-put vs. Pressure Drop
Composite No. 1



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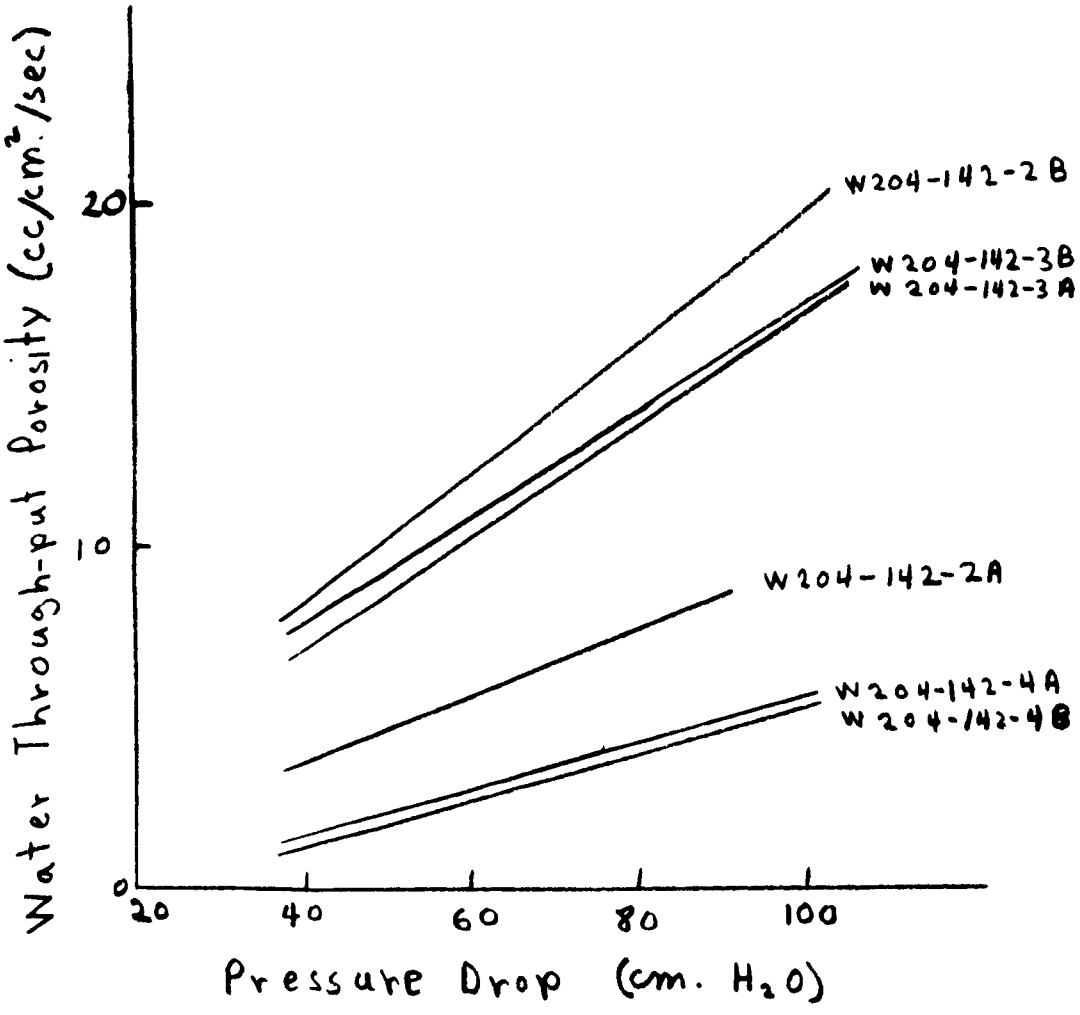
CHKD. BY..... DATE..... JOB NO.....

Figure 2
Water Through-put vs. Pressure Drop
Composite No. 1



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HKD. BY..... DATE..... JOB NO.....

Figure 3

Water Through-put vs. Pressure Drop

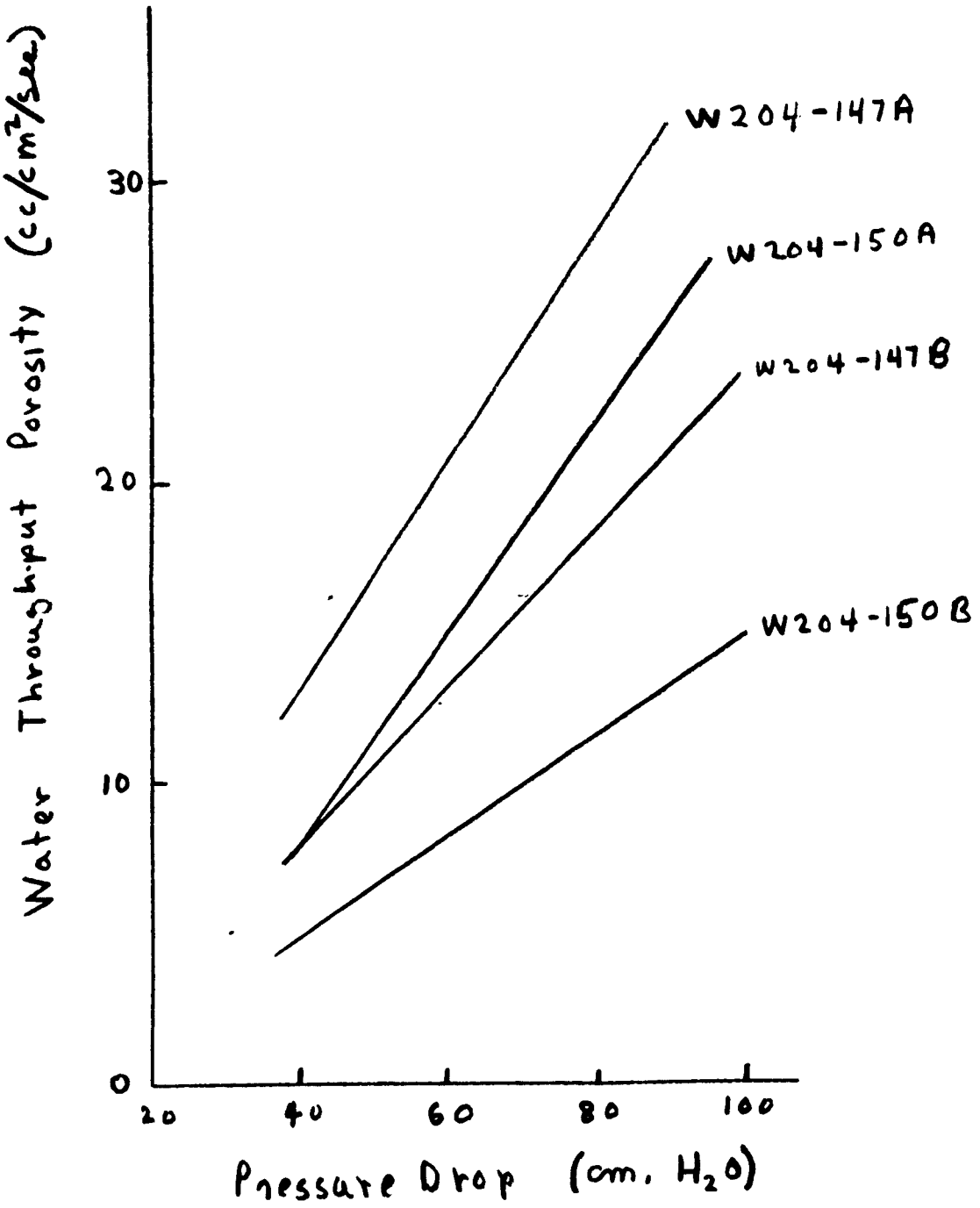

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Figure 4
Water Through-put vs. Pressure Drop
composite 2

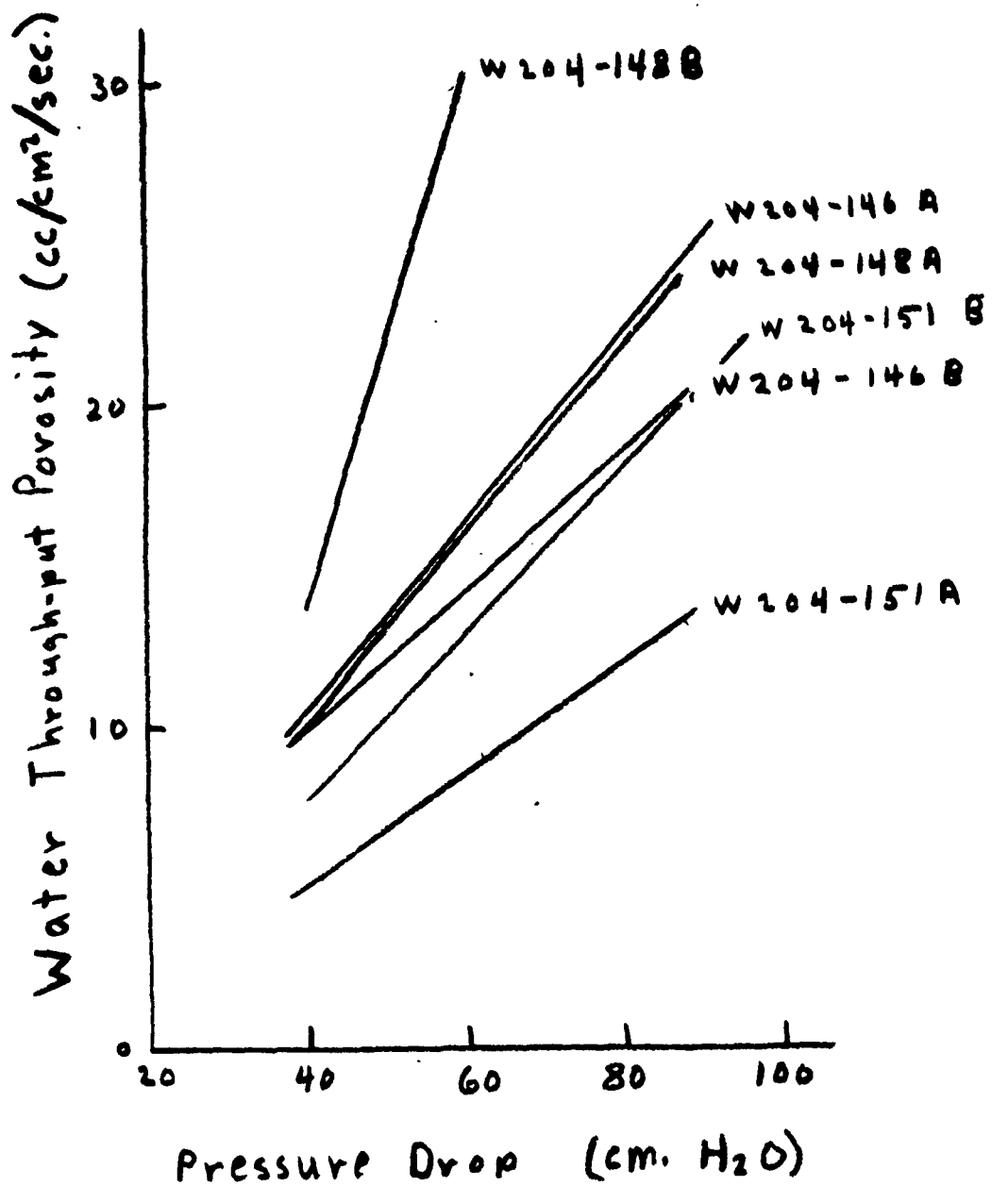

Figure 5
Water Through-putvs. Pressure Drop
Composite 3

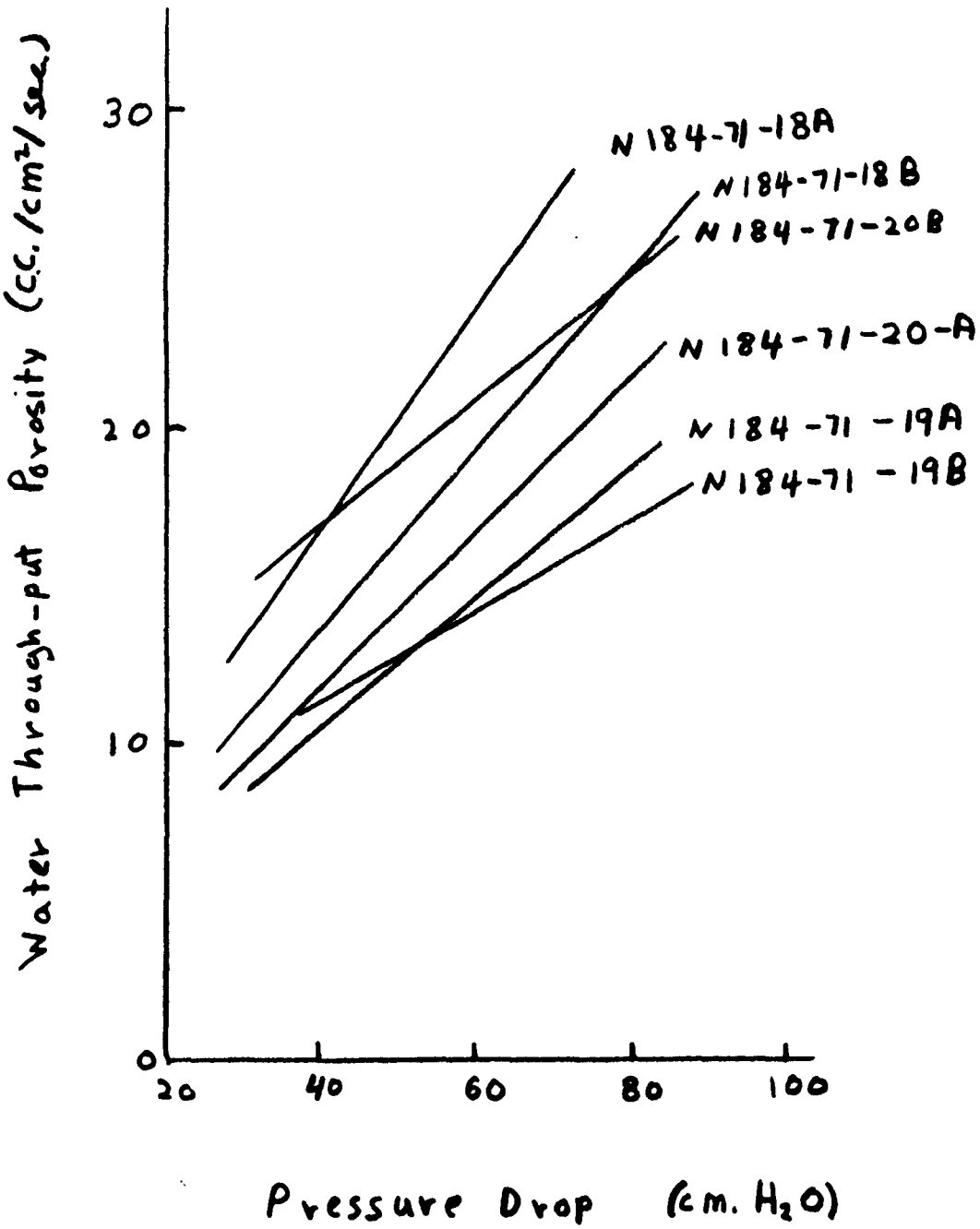

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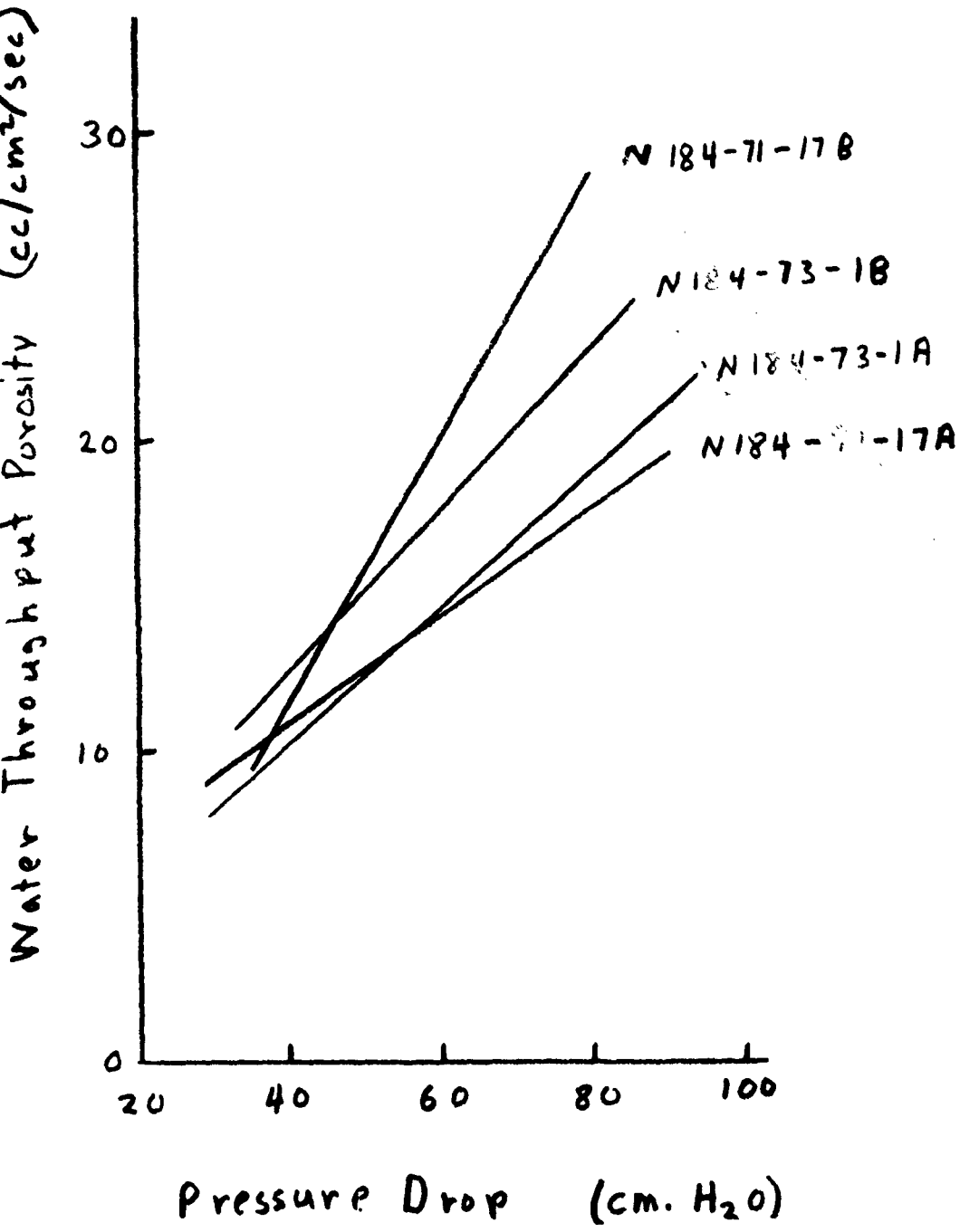
Figure 6

Water Through-put vs. Pressure Drop



ABSTRACT CARD

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AUTHOR (S) Carl A. Nielson, GerryN. Wixson

AGENCY: USA Prosthetics Res. Lab.
Walter Reed AMC, Washington 12, D. C.

TECH. RPT. 6307 May 1963 UNCLASSIFIED

Project 6X59-01-001-04

ABSTRACT:

A physical evaluation was made on composites of foamed acrylic-amide elastomer submitted for surgical evaluation as burn dressings.

AD _____ # _____

1. Burn dressing
2. Physical evaluation
3.
4.

WRAMC FORM 0183 (ONE TIME)
15 MAY 1961

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